

WHAT IS CLAIMED IS:

1. A method of forming a metal line layer in a semiconductor device,
comprising the steps of:

depositing a metal line layer on a semiconductor structure;

5 forming an insulating film and a photoresist material on the metal line
layer in a sequential manner;

 patterning the metal line layer by using the photoresist material and the
insulating film as a mask;

 removing the photoresist material; and

10 etching the insulating film in an isotropic manner.

2. The method of forming a metal line layer in a semiconductor device
according to claim 1, wherein the metal line layer has a multi-layered structure
including a Ti/TiN layer and an Al layer.

15

3. The method of forming a metal line layer in a semiconductor device
according to claim 2, wherein a first Ti/TiN layer, an Al layer, and a second
Ti/TiN layer are sequentially deposited in the metal line layer.

20

4. The method of forming a metal line layer in a semiconductor device
according to claim 1, wherein the insulating film includes a nitride film.

5. The method of forming a metal line layer in a semiconductor device according to claim 1, wherein a top layer in the semiconductor structure includes an oxide film.

5 6. The method of forming a metal line layer in a semiconductor device according to claim 1, wherein the method further comprises a step of forming a BARC layer between the insulating film and the photoresist material formation in order to prevent scattered reflection of light during the patterning of the photoresist material.

10

7. The method of forming a metal line layer in a semiconductor device according to claim 6, wherein the BARC layer and the insulating film are etched in a single step by using reactive plasma including $\text{CHF}_3/\text{CF}_4/\text{Ar}$ gases.

15 8. The method of forming a metal line layer in a semiconductor device according to claim 6, wherein the BARC layer and the insulating film are etched in a single step by using reactive plasma including C_xF_y (where x and y are any natural number) $/\text{O}_2/\text{Ar}$ gases.

20 9. The method of forming a metal line layer in a semiconductor device according to claim 6, wherein the BARC layer is etched in a dry manner by using reactive plasma including $\text{O}_2/\text{N}_2/\text{Ar}$ gases, and the insulating film is etched in a dry manner by using reactive plasma including $\text{CHF}_3/\text{CF}_4/\text{Ar}$ gases or C_xF_y (where x and y are any natural number) $/\text{O}_2/\text{Ar}$ gases.

10. The method of forming a metal line layer in a semiconductor device according to claim 1, wherein a down flow method using O_2/CF_4 gases is adapted in the step of etching the insulating film.

5

11. The method of forming a metal line layer in a semiconductor device according to claim 1, wherein the method further comprises a cleaning process in order to remove remaining metal polymers and/or metal residues after the step of etching the insulating film.

10